SCIENCE

EDITORIAL COMMITTEE: S. NEWCOMB, Mathematics; R. S. WOODWARD, Mechanics; E. C. PICKERING, Astronomy; T. C. MENDENHALL, Physics; R. H. THURSTON, Engineering; IRA REMSEN, Chemistry; J. LE CONTE, Geology; W. M. DAVIS, Physiography; O. C. MARSH, Paleontology; W. K. BROOKS, C. HART MERRIAM, Zoology; S. H. SCUDDER, Entomology; C. E. BESSEY, N. L. BRITTON, Botany; HENRY F. OSBORN, General Biology; C. S. MINOT, Embryology, Histology; H. P. BOWDITCH, Physiology; J. S. BILLINGS, Hygiene; J. MCKEEN CATTELL, Psychology; DANIEL G. BRINTON, J. W. POWELL, Anthropology.

FRIDAY, AUGUST 5, 1898.

CONTENTS:

The Boston Meeting of the American Association for the Advancement of Science.....141

The Jurassic Formation on the Atlantic Coast—Supplement: PROFESSOR O. C. MARSH.....145

Notes on the Geology of Jamaica: OSCAR H. HERSHEY 154

Current Notes on Anthropology:—
The Native American Languages; The Study of Decreased Natality; Mexican Flutes: PROFESSOR D. G. BRINTON.....155

Scientific Notes and News:—
The Maryland Geological Surveg; General.....156

University and Educational News.....161

Discussion and Correspondence:—
Science in the Bureau of Education: PROFESSOR JOHN GARDINER. *'The Psychology of Suggestion:'* DR. BORIS SIDIS. *Celluloid Films:* DR. HERMAN S. DAVIS 161

Scientific Literature:—
Bertrand's Au Pays des ba-Rotsi: PROFESSOR WILLIAM LIBBEY. *Rowley on the Art of Taxidermy:* F. A. L. *Fuertes on Water and Public Health:* PROFESSOR W. P. MASON. *van't Hoff on the Arrangement of Atoms in Space. Noyes and Milliken's Laboratory Experiments on the Class Reactions and Identification of Organic Substances:* PROFESSOR W. A. NOYES.....163

Scientific Journals.....168

New Books 168

MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE BOSTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE Fiftieth Anniversary of the American Association might well have been celebrated a year ago and, most fittingly, in Boston, for it was there, in 1847, that the Association of American Geologists determined to abandon the name and organization of a society which had enjoyed a prosperous existence for seven or eight years and by enlarging its scope and membership create the American Association for the Advancement of Science. In reference to this act, *Silliman's Journal*, in its first issue after the meeting, says: "The most important step taken at this meeting was the enlargement of the sphere of operations in this Association and a corresponding change of name, 'The American Association for the Promotion of Science,' is hereafter to be its designation, and it is designed to embrace all laborers in Physical Science and Natural History. Hitherto but few papers have been read on Chemistry, Natural Philosophy and General Zoology; the title of the Association appearing to many to exclude these topics. A corresponding increase of valuable papers

and collaborators it is anticipated will follow this desirable change."

The first meeting of the Association was held in Philadelphia, beginning September 20, 1848. The meeting was called to order by Professor W. B. Rogers, who was the last President of the 'Association of American Geologists and Naturalists.' A Committee had been appointed at the Boston meeting to draft a Constitution and Rules for the new body, and the report of this Committee was the first business considered. It was unanimously adopted and at 4 p. m. the American Association for the Advancement of Science was formally in session, under the Presidency of Wm. C. Redfield, who had been elected at the Boston meeting in accordance with the excellent practice of the earlier Association.

Some features of the first Constitution are worthy of notice. The rules relating to membership were a little peculiar. Certain persons were allowed to become members on their own volition, by signing the Constitution. They were members of other scientific or learned bodies publishing transactions, 'Collegiate Professors of Natural History, Physics, Chemistry, Mathematics and Political Economy, and of the Theoretical and Applied Sciences generally;' also civil engineers, architects and others who have been employed on public works. Persons not included in these classes might become members on nomination by the Standing Committee and election by a vote of the majority of the members present.

The honor of reading the first paper before the Association belongs to Peter A. Browne, LL.D., of Philadelphia, President of the Society for the Development of the Mineral Resources of the United States. The title of this paper was 'Some Notice of the Fossil Cephalopodes Belemnosepia, long known by the name of Belemnite, and of the Diphosphate of Iron, called 'Mullicite,' found together at Mullica Hill,' from which it will appear that the programs of the early days 'bristled' in much the same way as at present. On Friday evening, September 22, 1848, the Association held its first public, general session, a meeting that the modern program-maker would have set down as 'complimentary to the city of Philadelphia,' and complimentary to their intelligence it was, for its program included, in addition to the address of the retiring President (which was characterized as an 'extremely interesting and spirited discourse'), a paper on 'The General Principles of Analytical Mechanics' by Benjamin Peirce, and one on 'The Classification of the Animal Kingdom' by Louis Agassiz.

The Association adjourned on Monday, September 25th, with an enrolled membership of 461. The list begins with the name of Professor Stephen Alexander, of Princeton, and ends with that of Professor Ira Young, of Hanover, father of the distinguished astronomer, Professor C. A. Young, of Princeton. Active in the business of the meeting was Professor James Hall, of Albany, whom all members of the Association still delight to honor at its annual sessions. Of the total four hundred and sixty-one, besides Professor Hall, only six survive—Samuel L. Abbott, Martin H.

Boyé, Epes S. Dixwell, Wolcott Gibbs, Oliver P. Hubbard, Charles E. West.

It is not intended at this time and place to write a history of the Association, but only to suggest such comparison between its spirit and work in the earlier stages of its existence and in later years as may, possibly, indicate ways of bettering present conditions.

That the Association has been of incalculable value to American science no one can deny. The first Constitution declares its objects to be, "by periodical and migratory meetings, to promote intercourse between those who are cultivating science in different parts of the United States; to give a stronger and more general impulse and a more systematic direction to scientific research in our country, and to procure for the labors of scientific men increased facilities and a wider usefulness." This declaration is still retained in the organic law of the Society, except that its jurisdiction has been enlarged by substituting the word 'America' for 'United States' and omitting 'our country.' It is principally by 'promoting intercourse between those who are cultivating science' that the Association has been beneficial. The enormous extent of territory over which its membership is scattered has been at once a decided obstacle to that intercourse and the strongest reason for it. Hardly anywhere else in the world has the man of science been so isolated as in this country. The early and wide diffusion of public education resulted in the establishment of a large number of institutions for advanced instruction widely distributed over the States and Territories. However imperfect they may have been in many respects, nearly every one became a nucleus of scientific activity and from them have come some of the finest contributions to science of which America can boast.

The inspiration which came to hundreds of young men through personal intercourse at the annual meetings of the Association—intercourse not only with the recognized leaders in science, but with each other—was worth many times what these meetings cost, directly or indirectly. During perhaps the first thirty years of its history the American Association was the one and only great scientific body of this Continent. Its meetings were attended by all men of distinction in all departments of science, and its influence in all matters relating to science was great. Although a popular body, admission to which was easy, its affairs were in the main directed and controlled by the 'select' in science, and the standard of its work was well maintained. The presence at its meetings of the highest authorities in special departments of learning unquestionably, although perhaps unconsciously, served as a check upon communications of a vague and uncertain character. The charlatan was not much in evidence in those days and generally had little mercy accorded him. The 'migratory meetings' of the Association were blessings to the communities in which they were held, often stirring the people to an interest in science and an appreciation of the importance of scientific men that lasted for years and resulted in largely increased facilities for scientific work. The people everywhere knew something of the very

first men of science and gladly paid the cost of publishing the Annual Proceedings and of the entertainment of the Association for the privilege of seeing and hearing them, and many an endowment for science had its origin in the enthusiasm created by the presence and speech of these men.

But those who have attended the meetings of the Association pretty steadily during the past quarter of a century know, and many regret, that during the past fifteen or twenty years there has been a very considerable change in its relation to the science of the country and in the influence which it is able to exert in all matters relating thereto. There is no doubt that much of this is the legitimate outcome of an evolution which has been almost a revolution, and which has affected many other institutions even in a more marked degree. The tremendous movement towards specialization which has taken place during the past one or two decades has not been entirely beneficial to the interests of science and scientific men. The American Association has been most seriously affected by it, through the organization of numerous societies of and for specialists, which have materially diminished interest in the general organization. To this must be added the influence of the organization in 1864 of the National Academy of Sciences and especially its practical reorganization ten years later. As the only scientific body to which admission is to be gained only by character and importance of scientific work, the Acadamy is naturally and properly the aspiration of young men of science. It has indirectly worked an injury, however, to the American Association by the fact that many men of first rank find it difficult to attend meetings of both societies, and it is a notable fact that many later meetings of the Association have been conspicuous by the absence of a large majority of the leaders of American science. This absence, which is, perhaps, oftener to be attributed to lack of disposition than anything else, is doubly unfortunate because it removes one of the most important attractions to younger men of science.

The creation of special organizations, such as the Geological Society of America, the American Chemical Society, the American Society of Naturalists, and others, has been one of the most serious blows to the American Association. In 1881 it sought to meet the growing demand for specialization by breaking up into sections, but for some reason this has not satisfied the desire of the specialists. It is gratifying to record the fact that among some of the more recent organizations a better spirit towards the older society has prevailed during the past two or three years, and there is an evident disposition toward cooperation which the latter ought quickly to take advantage of. Indeed, it is to be hoped that a way may yet and soon be found for further cooperation between these societies and the Association, it being evident that all may be greatly benefited thereby.

Many men, eminent in science to-day, owe much of their prominence to opportunites which came to them through the meetings of the American Association a score or more years ago. With them and all, indeed, the obligation to sustain and

foster the interests of the Association ought to be imperative. Through its semi-popular character and close touch with the people, many things have been 'set going' to the great advantage of the members of the National Academy and of other more or less exclusive bodies, but they will not, of themselves, keep going forever. It will be a sorry day for science when the general public is compelled to depend upon the columns of such a press as at the present time enlightens and instructs its readers in matters scientific. If for no other reason, the best men in science might well afford to join the Association in its migratory meetings, that the people might have a chance to know real science in contrast with the quackery and humbug which is now daily served out to them. This is preeminently a function of this organization and one which cannot be assumed by the National Academy of Sciences, or any of the specialized groups. The same may be said of the importance of the Association in exercising a wise influence over public sentiment in reference to all questions of general interest in which science is in any way involved. From the beginning this has been one of its most valued and valuable features. Allied to no other organization or State or National Government, it has always dared to speak its mind and in no uncertain way. The National Academy, although the scientific adviser of the government, is almost useless in this respect, because it waits until its advice is sought. There is, and always will be, great need for a strong representative scientific body, unrelated to political parties or government bureaus, through which the consensus of opinion of scientific men of the country may find free expression, especially in regard to the scientific work and interests of the government. In view of the rapidly increasing tendency towards centralization of scientific work in the government, and the constant dangers by which such work is threatened when under government control (a danger quite as likely to grow up within as to come from without), it will be well worth while to maintain the Association for this purpose, if for no other.

The meeting in Boston must necessarily be one of great moment. As the fiftieth anniversary meeting it will attract many of the older members who have not generally attended recent meetings, and many young lovers of science who may with great profit to themselves join its ranks. The place and the time are both encouraging, and SCIENCE hopes that the interest and enthusiasm that is sure to be awakened may be such as to lead to a better appreciation of the dignity and importance of the organization on the part of the leaders of American science, and to such a readjustment of its internal policy and external relations as will best fit it for the great work which it will be called upon to do during the next half century.

---

*THE JURASSIC FORMATION ON THE ATLANTIC COAST—SUPPLEMENT.**

AT the autumn meeting of the National Academy last year, in New York, I made a communication entitled 'The Jurassic For-

* Abstract of a communication made to the National Academy of Sciences, Boston meeting, November 18, 1897.

mation on the Atlantic Coast.'* In this paper I brought together the results of a careful investigation which I had been conducting for several years, going to prove that the Jurassic formation, generally supposed to be wanting on the Atlantic border, was represented by a definite series of strata in the exact position where such deposits were to be expected. Accompanying this communication, I exhibited a number of drawings and sections illustrating the Jurassic deposits of the West, which I had long before investigated and fully described, namely, the Baptanodon beds, consisting of marine Jurassic strata with many characteristic fossils, mostly invertebrates, and above these the fresh-water Atlantosaurus beds, which have yielded such vast numbers of gigantic reptiles and other characteristic vertebrates. Sections showing the relative positions of these deposits, with the strata above and below them as they are seen in several localities in Wyoming and Colorado, were also exhibited.

In comparison with this great development of the Jurassic in the West, I next discussed the so-called Potomac formation in Maryland, in which I had found a corresponding vertebrate fauna that proved the strata containing them to be also of Jurassic age. I then gave a brief account of my researches during that season, in following essentially the same strata to the eastward through Delaware and New Jersey, and likewise presented evidence showing that apparently the same Jurassic beds were to be found in position beneath Long Island, Block Island and Martha's Vineyard, represented by the variegated basal clays of these islands, which had previously been supposed to be of much later age. The evidence seemed conclusive that in this series we had remnants of an extensive formation of fresh-water origin, the strata consisting mainly of soft sandstones and plastic clays of great thickness. In their physical characters, and especially in their variegated brilliant colors, these deposits differed widely from any others known on the Atlantic border, and were only equalled in this respect by the Jurassic beds of the Rocky Mountain region. The presence on the Atlantic coast of such an extensive formation, with its massive beds of plastic clay, all of fresh-water origin, clearly proved the former existence of a great barrier between the basin in which these clays were deposited and the Atlantic Ocean, a barrier that has long since disappeared through subsidence, or was broken down by the waves of the Atlantic, which are still rapidly removing the remnants of the formation along its eastern exposure, as may be seen on Block Island and at Gay Head on Martha's Vineyard.

In discussing the age of this formation, its position above the Triassic and below the marine Cretaceous, its characteristic physical characters, distinct from those above and below, and its western extension into the strata of undoubted Jurassic age in the Potomac beds of Maryland, all pointed to the conclusion that its members belong to the same general epoch and were deposited during Jurassic time.

In the paper thus cited I confined myself strictly to the Potomac formation north of the Potomac River, and what I believed to be its eastern extension as far as Martha's Vineyard, all of which I had personally explored. I particularly avoided any discussion of the so-called Potomac beds south of the Potomac River, although I had been over these deposits at various points along the Atlantic border and around the Gulf as far as the Mississippi River. I closed the paper with the promise of taking up that part of the subject later.

As the question was a difficult one and

* Science, Vol. IV., p 805, December 4, 1896. See also *American Journal of Science*, Vol. II., p. 295, 375 and 433, 1896.

still under investigation, I likewise guarded myself against expressing the opinion that all the so-called Potomac deposits were Jurassic. My words on this point were as follows:

"It cannot, of course, be positively asserted at present that the entire series now known as Potomac is all Jurassic, or represents the whole Jurassic. The Lias appears to be wanting, and some of the upper strata may possibly prove to belong to the Dakota."*

THE DAKOTA SANDSTONE.

In regard to the sandstone known as Dakota, and generally considered of Cretaceous age, I spoke cautiously, as behooves anyone who has seen this formation at many of its outcrops over a wide range of territory in the West, where its physical characters are striking and its fossil remains are mainly detached leaves of plants.

In figure 1 of my paper, showing geological horizons and designed especially to represent the succession of vertebrate life in the West during Mesozoic and Cenozoic time, and so defined in the text, I left a blank space above the Jurassic for the Dakota, exactly where I had found a sandstone, regarded as Dakota, in place at many widely separated localities. I said little about the Dakota itself, as I did not wish then to raise questions outside the scope of my paper.

Had the occasion been appropriate, I might have said that the group termed Dakota in my section I consider as more extensive than the single series of sandstones defined as Dakota by Meek and Hayden in 1861. The original locality of this sandstone was the bluffs near the Missouri River in Dakota County, Nebraska, and these authors included with this the supposed southern extension of the sandstone in eastern Kansas. This placed the Dakota on the eastern margin of the great Cretaceous basin which extended westward to the Rocky Mountains. The attempt of Meek and Hayden to identify the Dakota further north, near the mouth of the Judith River, is now known to have failed, but the name transferred to certain sandstones along the flanks of the Rocky Mountains has been accepted, and this term has long been in use for these strata from Canada to Mexico. With this so-called Dakota sandstone, however, have been included other deposits, the upper part of which may be Cretaceous, while the rest I regard as Jurassic, and with good reason. These intermediate beds may be seen at various places, especially around the border of the Black Hills and along the eastern flanks of the Rocky Mountains in Colorado. As I shall refer to this point later in the present communication, I will not discuss it here.

OPINIONS OF VARIOUS GEOLOGISTS.

The paper I have now cited I regarded as the preliminary statement of an important case, and not its final demonstration. When presented to the Academy it received the general approval of the members interested in the subject, and one of them, the late Professor Cope, who was best qualified to weigh the evidence of paleontology, fully endorsed my conclusions, and added that he himslf had long suspected that the strata under discussion would prove to be of Jurassic age.

When an abstract of my communication was published, although without the main illustrations shown to the Academy, I received further endorsement from geologists familiar with the subject, but from others marks of disapproval predominated. This I had anticipated in a measure, especially from the paleobotanists, whom I believed responsible for much of the confusion that had so long delayed the solution of similar questions, East and West. This point I

*SCIENCE, Vol. IV., p. 807, 1896.

brought out in my paper, but in an impersonal manner that I hoped would offend none of the craft.

The prompt and vigorous rejoinders that even my first informal announcement drew from two paleobotanists, A. Hollick and L. F. Ward,* showed that I had trespassed upon their bailiwick, and that some of the questions raised they had settled to their own satisfaction. As their ideas in regard to the value of fragmentary fossil plants as evidence of geologic age differed so widely from my own and from those of many paleontologists, no specific reply on my part seemed necessary, and I have none to make now. Professor Ward has admitted that the plants found with the vertebrates in the Potomac beds of Maryland may be Jurassic, and that removes one of the main points at issue between us. His words are as follows:

"If the stratigraphical relations and the animal remains shall finally require its reference to the Jurassic the plants do not present any serious obstacle to such reference." (Loc. cit., p. 759.)

That the more eastern beds may represent a somewhat higher horizon I can readily believe, but I must doubt the evidence that would separate so characteristic and homogeneous a series of sands and plastic clays into two sections, one Cretaceous and the other Jurassic. The few imperfect plant remains that we are told authorize this separation must be reinforced by other testimony to obtain even the support of probability, especially when paleobotanists differ so widely among themselves as to the real significance of the fragmentary remains they describe.

Next in order among my reviewers was R. T. Hill,† well known for his researches in the geology of Texas, but apparently not familiar with the typical Jurassic, East or West. He evidently had not read my paper carefully, though he criticises it at length, mainly to confirm his own conclusions as to the Cretaceous age of certain deposits in Texas, which he seems to imagine I do not endorse. As I especially avoided expressing any opinion on that point, or in regard to the Dakota being the base of the Cretaceous in this country, as I have already stated, no reply at present seems called for on my part, although I hope later to refer to the question he raises about the age of the so-called southern Potomac.

I took it for granted, in my paper cited, that American geologists who were not familiar personally with the great development of the Jurassic formation in Europe, or who had no opportunity of examining typical sections of this formation in western America, or of seeing its deposits in place full of characteristic fossils and extending hundreds of miles in half a dozen States, were at least sufficiently acquainted with the literature of the last twenty years to know that two of the best-marked Jurassic horizons in any part of the world existed in this country.

Although my communication, as printed, was in fairly clear English, I find it was misunderstood in various other points, as subsequent reviews soon showed. If these marks of disapproval had been recorded by fireside geologists, who so often differ with those who furnish facts, I should have followed my usual rule and made no reply. They were, however, mainly written by field geologists who had seen something of the West, and ought evidently to have seen more, for the facts I stated can be readily verified at any of the localities mentioned and at many others. The failure to do so well illustrates a law of human nature, namely, that men see what they have eyes to see. The West is an extensive country. The plant men who go there seem to see

* Science, Vol. IV., p. 571 and 757, 1896.

† Science, Vol. IV., p. 918, 1896.

only fossil plants; the invertebrate collectors notice only their own favorites, and, as both classes are numerous, the extinct vertebrates are too often overlooked or only peculiar and striking specimens secured. Thus the most valuable evidence as to the age of strata is neglected, and the decision rendered has so frequently to be reversed. This neglect is not confined to field work alone, where fossil vertebrates should be found, but too often extends to the literature of the subject.

Let me illustrate this by a short quotation from a well-known work:

"The Jurassic system, which is so largely developed in Europe, containing the remains of huge swimming and flying reptiles * * is but sparingly represented in American geology, and none of the gigantic vertebrates have as yet been found here."*

The above extract may fairly be taken as representing the information on the subject known to the authors, or at least to the editor when this work was published. It is, moreover, a fair sample of much that has since been written about the Jurassic formation of this country and its fossil contents, especially by those not familiar with this subject, but whose work in allied fields should at least have made them acquainted with the main results of our vertebrate paleontology, which had become a part of the world's scientific knowledge.

For example, at the time the above work was published, one of the most fruitful horizons of vertebrate fossils ever discovered had been known for several years in the Jurassic of the West. Many tons of gigantic fossil vertebrates had been collected from several localities, and the principal forms described and figured, while the illustrations had been reproduced even in text-books. Moreover, the Jurassic horizon in which these and other remains were found had been definitely determined and named the Atlantosaurus beds, and a geological section showing their position and characteristic genera had been published several times. The fossils thus discovered embraced mammals, birds, reptiles and fishes, nearly all of well-marked Jurassic types.

Since 1880, when the statement I have quoted was made, other discoveries have followed in rapid succession, and the Jurassic vertebrate fauna of the West is now known to be a most rich and varied one, far in advance of that from any other part of the world. More than one hundred and fifty species of extinct vertebrates, some of them represented by hundreds of specimens, have been brought to light, and over one hundred of these have already been described, and the more important have been refigured and republished in various parts of the world, including text-books, so that anyone with even an elementary knowledge of the subject can see that they are Jurassic in type. Nevertheless, a number of American geologists whose studies have kept them in other fields still appear to be ignorant of nearly all that has been made known about vertebrate paleontology in this country during the last quarter of a century, and seem to think that the Jurassic formation here is of small importance, and that its area should be restricted rather than enlarged.

Another of my reviewers was G. K. Gilbert, editor of the work from which I have just quoted. Whether he intended his remarks on my paper to be taken seriously is not clear. Apparently he wished to start an academic discussion on correlation, and under the circumstances this would probably have led from the Rocky Mountains to the Mountains of the Moon, one of his latest fields of investigation. If he is really in doubt about the methods of correlation of vertebrate fossils he can per-

*Geology of the Black Hills, by Newton and Jenney, edited by G. K. Gilbert, p. 151, 1880.

haps find the information he needs in text-books.

First of all, however, I must question the accuracy of some of the statements in his review of my paper. One of these is as follows:

"Through a comparison of vertebrates from the Potomac formation with vertebrates from other formations he has inferred the Jurassic age of the Potomac, but he gives no hint of the character of his evidence or the course of his reasoning."*

Had this critic read the whole of my paper he would have found the following statement bearing on this point:

"The Jurassic age of the Atlantosauras beds of the West has now been demonstrated beyond question by the presence of a rich fauna of mammals, birds, reptiles and fishes. Among these, the Sauropoda were dominant, and the other Dinosaurs well represented.

"In the Potomac beds of Maryland the same Jurassic vertebrate fauna is present, as shown by the remains of five different orders of reptiles already discovered in them. Among the Dinosaurs are the Sauropoda, the Theropoda and the Predentata, the first group represented by several genera and a great number of individuals. One of these genera is *Pleurocœlus*, which has also been found in the Jurassic of the West. Besides the Dinosaurs, characteristic remains of *Crocodilia* and *Testudinata* are not uncommon, and various Fishes have been found. The remains of these six groups already known are amply sufficient to determine the age of the formation, and still more important discoveries doubtless await careful exploration."†

Mr. Gilbert's next statement, which is also without real foundation, is as follows:

"The conclusion that the Atlantosaurus and other horizons of the Rocky Mountain region are Jurassic was announced in the same way, without citation of evidence."

The announcement of the Atlantosaurus beds as Jurassic was accompanied by a section showing their exact position in the geological scale, and the characteristic genera of Reptilia which then indicated their Jurassic age.* This was followed by descriptions, in rapid succession, of many other vertebrate fossils, proving beyond question that the horizon was Jurassic. The Baptanodon beds were also defined, and their position in the geological series established by characteristic fossils. The demonstration on this point I have already given above and need not repeat here.

Another point needs correction, as Mr. Gilbert evidently consulted my recent classification of the Dinosauria† without appreciating the evidence it contained. This is shown by the following quotation from his review:

"The closest affinity of the European and American formations seems to be expressed by the statement that there is one American genus which falls in the same family with a European genus."

The genera named in my recent classification were mainly typical forms, and I had no intention of making a complete catalogue of all the known genera, as anyone familiar with the subject could readily see. By way of further instruction, let me repeat here what I have recently said about one of these typical forms.

"*Pleurocœlus* is one of the most characteristic genera of the Sauropodous Dinosauria, and its value in marking a geological horizon should, therefore, have considerable weight. It is now known from the two European localities mentioned above, both

* SCIENCE, Vol. IV., p. 876, 1896.
† SCIENCE, Vol. IV., p. 814, 1896.

*Proceedings of the American Association, Nashville meeting, p. 220, 1878; see also *Popular Science Monthly*, p. 520, March, 1878.

† The Dinosaurs of North America, 16th Annual Report U. S. Geological Survey, p. 238, 1896.

in strata of undoubted Jurassic age. The same genus is well represented in the Potomac deposits of Maryland, and has been found, also, in the Atlantosaurus beds of Wyoming, thus offering, with the associated fossils, strong testimony that the American and European localities are in the same general horizon of the upper Jurassic."*

Had Mr. Gilbert been familiar with the subject discussed in his review he would have known that, so far as present evidence goes, there are other genera of Dinosaurs common to Europe and America, found in apparently the same Jurassic horizon, and that this is true also of various other reptiles and of fishes. More important still is the correspondence between the genera of Jurassic mammals of the two continents, which in itself is sufficient to demonstrate that they belong in essentially the same horizon.

The last point Mr. Gilbert raises in his review is a geological one, and even here he has missed the mark. His words are as follows:

"The physical relations of the beds afford a presumption in favor of their Cretaceous age. Professor Marsh mentions that the Potomac formation in New Jersey passes by insensible gradation into marine Cretaceous above."

The two statements in this quotation are, in my opinion, both erroneous, and the second is contrary to the idea I intended to convey. The physical relations of the beds in question are in favor of their Jurassic age, and the Potomac strata do not pass by insensible gradation into the marine Cretaceous above. Although the two are apparently conformable, the passage from one to the other was a change from fresh-water to marine deposits, which in itself implies a break that may represent a long period of time, perhaps the entire Lower Cretaceous. This break was clearly indicated in the geological section that I gave in my paper (figure 2), and to make this point clear the same section is here repeated.

This typical section represents the successive Mesozoic and more recent formations, from New Brunswick, New Jersey, on a line southeast, through Lower Squankum to the Atlantic. The distance indicated is about forty miles.

Geological Section in New Jersey.

a, Triassic; *b*, Jurassic; *c*, Cretaceous; *d*, Tertiary; T, tide level.

My explanation was as follows:

"The change from the fresh-water plastic clays of New Jersey to the marine beds containing greensand over them proves not only the breaking down of the eastern barrier which protected the former strata from the Atlantic, but a great subsidence also, since glauconite, as a rule, is only deposited in the deep, still waters of the ocean."*

Since my paper was published, I have been over part of this section several times, and found clear indications of the break itself. Moreover, Professor W. B. Clark, of Baltimore, informs me that he finds distinct unconformity between the marine Cretaceous and the underlying Potomac, along the junction of these two formations, at various other points further south. This

* *American Journal of Science*, Vol. IV., p. 415, December, 1897.

* SCIENCE, Vol. IV., p. 812, 1896.

fact furnishes a strong argument that the marine Cretaceous belongs to a separate formation from the older fresh-water clays, here regarded as Jurassic.

Another geologist who has written much about the West, but seems to have failed in comprehending the evidence afforded by the vertebrate fossils from well-marked Jurassic horizons, is C. A. White, and, as his opinion is frequently quoted, it may be well to correct one of his statements which bears on the question here discussed. In speaking of the Atlantosaurus beds, in 1889, he made this statement:

"If it were not for their dinosaurian faunas their Jurassic age might well be questioned."*

When this statement was made, more than one hundred species of vertebrate fossils besides the Dinosaurs were known from these same Atlantosaurus beds, and among these the Crocodilians, the Testudinates and the various smaller reptiles would have been sufficient to demonstrate the Jurassic age of the strata containing them. More important still, several hundred specimens of Jurassic mammals had been found, over a score of species were already described and figured, and these alone were sufficient to prove the horizon Jurassic.

Following these well-known writers, others of less experience in the West have repeated their statements or followed the earlier geologists as to the age of western horizons, and thus tended to continue the confusion where the facts themselves made the whole subject clear. Thus it has come to pass that while the Jurassic formation has been recognized in the Arctic regions of this Continent, and along the Pacific coast, especially through Oregon and California, as well as in Mexico, and likewise in various parts of South America, its development in the Rocky Mountain region has received little attention except from those especially engaged in its investigation. It is not strange, then, that those who have not seen how extensive the Jurassic formation is developed in Europe, and have not examined its characteristic exposures in the West, should fail to recognize it on the Atlantic coast where its features at many points are obscure.

In my paper on this subject last year I endeavored to show that the burden of proof must rest upon those who denied the existence of the Jurassic formation on the Atlantic border. The evidence against it is still based mainly upon fragmentary fossil plants, in regard to the nature of which the paleobotanists themselves are not in accord.

CYCAD HORIZONS.

I have recorded elsewhere my opinion of the comparative value of different kinds of fossils—vertebrates, invertebrates and plants—as evidence of geological age, and have endeavored to show that plants, as usually preserved and described, are the least valuable witnesses. The evidence of detached fossil leaves and other fragments of foliage that may have been carried hundreds of miles by wind and stream, or swept down to the sea-level from the lofty mountains where they grew, should have but little weight in determining the age of the special strata in which they are imbedded, and failure to recognize this fact has led to many erroneous opinions in regard to geological time. There are, however, fossil plants that are more reliable witnesses as to the period in which they lived. Those found on the spot where they grew, with their most characteristic parts preserved, may furnish important evidence as to their own nature and geological age. Characteristic examples are found among the plants of the Coal Measures, in the Cycads of Mesozoic strata, and in the fossil forests of Tertiary and more recent deposits.

* Proceedings of the American Association, Toronto meeting, p. 213, 1890.

As bearing directly on the question here discussed, the Cycads of the Jurassic period afford instructive examples of the evidence that may be derived from fossil plants under favorable circumstances. The Cycad trunks of the upper Jurassic of England have long been known, and are especially interesting from the fact that many of them are found imbedded in the original soil in which they grew, thus marking a definite horizon, the age of which has been ascertained by independent testimony.

On the Atlantic border of this country we have a corresponding horizon, determined to be such by its position and by the vertebrate fossils it contains. At various localities in this horizon, especially in Maryland, Cycad trunks have long been known, and within a few years numbers of very perfect specimens have been found under circumstances that serve to fix the horizon in which they occur, and confirm the evidence as to its geological age.

In the Rocky Mountain region, especially around the margin of the Black Hills, a definite horizon likewise exists, in which great numbers of Cycad trunks are found in remarkable preservation. These Cycads resemble most nearly those from Maryland, found in what I term the Pleurocœlus beds of the Potomac formation. In the Black Hills the age of the horizon has not been accurately determined, but present evidence points to its Jurassic age. The strata here containing these characteristic fossils has long been referred to the Dakota, but, as I have already shown in the present paper, the beds so termed in the Rocky Mountain region are not the equivalents of the original Dakota, and some of them are evidently Jurassic. Until recently the Cycads of the Black Hills, although of great size and remarkable preservation, have not been found actually in place. In the large collection of Cycads belonging to the Yale Museum a few have been discovered apparently where they grew, and systematic investigation will doubtless show that the various localities where these fossils have been found around the Black Hills are all in one horizon. The evidence now available indicates its Jurassic age, and suggests that it is essentially the same as that of the Cycad beds in Maryland, which I regard as a near equivalent of the well-known Cycad horizon in the Purbeck of England.

In conclusion, I have only to say that the year which has passed since my first communication to the National Academy on the Jurassic of the Atlantic border has brought no important evidence against the view I then maintained, but much additional testimony in its favor, especially in the region north of the Potomac River that I then discussed. I still hope to return to the subject later and take up the question of the extension of the same formation along the Atlantic coast farther south, and around the Gulf border to the southwest, where new evidence is now coming to light.

Postscript.

After the preceding article was in print I received some information about Cycad horizons in Wyoming that bore directly on the question I discussed near the end of my paper. This information is of so much interest that I add a postscript to place on record the important discovery by W. H. Reed of two new Cycad localities in the Jurassic of Wyoming, both much farther west and quite distinct from those already known around the Black Hills. One is in the Freeze Out Hills of Carbon county, and the other near the Wind River range.

Mr. Reed has since sent me a more complete account of the first of these localities, with a sketch showing the section of the strata where the Cycads were found, and also measurements of the successive strata exposed, from the Trias

up to the so-called Dakota sandstone that caps the bluff at that point. The marine Baptanodon beds here show a thickness of thirty-five feet. Above these is a series of fresh-water sandstones and shales, sixty-six feet in thickness, which in places contain remains of Laosaurus, a typical Jurassic Dinosaur. Immediately above these the Cycads occur in a narrow layer of white sandstone, and with them are various fragments of bones. Next above are fifty-five feet of strata containing vertebrate fossils, apparently indicating the Atlantosaurus beds. Above these are thirty feet of barren clays, and over all is the sandstone regarded as Dakota.

Mr. Reed has also sent me specimens of the Cycads found at this locality. As he has had an experience of twenty years or more on the Jurassic of the West, and is otherwise admirably qualified to judge of such horizons, his opinion is entitled to great weight and should settle the question for this locality.

Mr. H. F. Wells, who has carefully explored the Black Hills Cycad horizon, and sent to the Yale Museum over one hundred specimens of these fossils, has also, at my request, sent me a section, made near Blackhawk, on the eastern rim of the hills, a region which I have myself examined, although not recently. This section indicates that the Cycad horizon there is also in the Jurassic, and not the Dakota, and this is borne out by other localities in the same vicinity.

Professor L. F. Ward has published sections examined by him on the southwestern border of the Black Hills in 1893. He found no Cycads actually in place, but decided that the horizon in which they occur is Cretaceous.* I have recently placed in his hands for description all the Western Cycads in the Yale Museum. Our views, however, do not at present coincide as to the age of the strata containing them, but the new facts which are now being brought to light will, I trust, soon place this matter beyond reasonable doubt.

O. C. Marsh.

Yale University,
New Haven, Conn., July 18, 1898.

* *Journal of Geology*, Vol. II., p. 250, 1894.

NOTES ON THE GEOLOGY OF JAMAICA.

The eastern portion of the island of Jamaica, in the West Indies, is remarkable for its high abrupt mountains, whose ragged outlines resemble those of the high sierras (not the volcanic ranges) of the Pacific side of Central America and Mexico. These mountains rise steeply from the ocean east of Kingston on the south side and near Port Antonio on the north side of the island, and in Blue Mountain peak attain an altitude of about 7,000 feet. The topography is essentially that of subaërial erosion, the sharp rocky mountain ridges being due to the excavation of deep narrow stream valleys in a great uplift which originally extended beyond the limits of the island.

So far as I have been able to learn from observation and conversation with residents, the entire mass of this Blue Mountain system, in the eastern end of the island, is composed of one great white limestone formation. This may be soft and chalky; it may be brecciated and in places quasi-conglomeratic; it may be a hard compact fine-grained sub-crystalline white limestone nearly free from fossils, as in the case of the material used for macadam in the streets of Kingston; or the same white limestone abundantly fossiliferous, as at Port Antonio. This latter locality is an interesting one. Reef-building coral species are numerously represented in the mass of the rock, and the white formation is evidently a coralline limestone. There are the casts of many other marine species of shell-bearing animals, particularly gasteropods and allied

forms. I make no pretentions to expertness in paleontological knowledge, but the fossil fauna at Port Antonio impressed me as being of an Eocene facies. On the Isthmus of Panama, where the horizon is due in the column of strata, there is nothing at all representing this immense coralline limestone of Jamaica. But in Citrus county, Florida, I studied, several years ago, a white coralline Eocene limestone, which seems to me to have a fauna of a facies similar to that at Port Antonio. Certainly there is a remarkably close resemblance between the two formations. If they are parts of the same formation, or limestones formed under like conditions and of the same age, the Blue Mountains of Jamaica consist of a deeply eroded massive 'uplift' of the Vicksburg-Jackson limestone, as the Eocene coralline limestone of the southeastern portion of the United States has been named.

The railroad between Kingston and Port Antonio is built over the white limestone nearly all the way. But for some short distance on the north of the divide and south of Morant Bay the many cuts expose a heavy series of soft or semi-lithified clays, which are probably newer than the limestone.

The only other formation of any importance which was observed on the island is a gravel deposit of Quaternary age which forms an even but gently sloping plain between Kingston and Spanish Town and is represented at intervals on the north coast, where it forms uneven terraces of no great height, indicating apparently a slight uplift of the island in some not very late part of the Quaternary Era.

OSCAR H. HERSHEY.

FREEPORT, ILL., June 24, 1898.

CURRENT NOTES ON ANTHROPOLOGY.

NATIVE AMERICAN LANGUAGES.

IN the *Proceedings* of the Canadian Institute, May, 1898, the Rev. E. B. Glass has a few pages on the Cree language. He discusses its euphony, precision, and the formation of its nouns.

The Rev. John Campbell prints another of his 'discoveries' in the *Transactions* of the Canadian Institute (May, 1898). The title is 'The Dénés of America identified with the Tungus of Asia.' Mr. Campbell has announced so many such discoveries that it is difficult to secure consideration for more of them.

The death of Professor Dr. Friederich Müller, of Vienna, which occurred May 25th, should not be allowed to pass without a tribute to his studies of American languages. In the second volume of his great work 'Grundriss der Sprachwissenschaft' (Vienna, 1882), he presented the analysis of forty-one native tongues and dialects spoken by the aborigenes of this continent, in accordance with the most rigid demands of science. He avoided the treacherous ground of verbal comparisons, and devoted his attention to morphology and grammatical structure. Both in extent and scholarly thoroughness, his work in this branch stands easily ahead of that of any other writer in this generation.

THE STUDY OF DECREASED NATALITY.

FEW subjects in anthropology have more practical bearing than that of the decadence of races. This comes most directly from a diminished birth rate. It has been calculated that a minimum of four living children are required to each marriage under ordinary conditions in order merely to prevent diminution. Decrease in natality, therefore, is an ominous outlook for a community.

A study of it in the United States by Dr. K. R. Storer appeared some months ago (reprint from *Atlantic Monthly*, October, 1897). It is disappointing in both facts (?) and conclusions. With his full opportunities of observation he is quite unable to

present his statistics in scientific form. What nonsense to talk of the laws of decreased natality as 'a penalty inflicted for the sin of the people' (p. 32)! Or to attribute the greater fecundity of our foreign-born population to 'the watchful protection of the Roman Catholic Church' (p. 25), in face of the facts that a large percentage of the foreign-born are not Catholics, and in France, where 95 per cent. of the population are Catholic, the decrease of natality is more striking than in any other country! The topic must be studied in a very different spirit from this in order to reach results worth anything.

MEXICAN FLUTES.

A CONTRIBUTION by Professor Kollmann, of Basel, to the Bastian *Festschrift* should be mentioned, though it is a little late to refer to it.

The subject is a portion of the collection of Mexican antiquities brought to Basel about 1837 by Lucas Vischer. It includes a number of flutes and whistling jars of pottery, not materially unlike quantities of others in various museums. Professor Kollmann describes and figures them, speaks of their employment in religious and other ceremonies, and speculates as to their origin, seemingly leaning toward an 'Asiatic' suggestion. He is in error in supposing the flute was confined to the aborignes of Mexico and Central Ameria. It was known to the Indians of Florida and elsewhere.

D. G. BRINTON.
UNIVERSITY OF PENNSYLVANIA.

SCIENTIFIC NOTES AND NEWS.

THE MARYLAND GEOLOGICAL SURVEY.

WE learn from an article in the Baltimore *Sun* that the work of the Maryland Geological Survey, which is being carried on under the direction of Professor William Bullock Clark, of the Johns Hopkins University, State Geologist, is being pushed with vigor in several sections of the State. A large area will be thoroughly surveyed during the present summer. At the same time the results of the previous work are being rapidly brought together for publication, and the second volume of the Survey Reports, much elaborated over earlier plans, will shortly appear.

The topographic work which is being carried on under an act of the last Legislature, in cooperation with the United States Geological Survey is making rapid strides in the mountainous portions of western Maryland and Garrett and Alleghany counties, and will be completed before the close of the field season. The geological work proper is being carried on at the present time in sections of western, southern and northern Maryland. A party of several geologists, under the direction of Dr. G. B. Shattuck, is studying the later Tertiary formations, with their marls, clays and gravels, in the southern counties, while associated with them during most of the season has been Dr. R. M. Bagg in a study of the earlier Tertiary of Anne Arundel and Prince George's counties. Mr. A. Bibbins is engaged in the study of the clays and iron carbonate deposits of the older coastal plain formations in Cecil and Harford counties, and their extension beyond the limit of the State.

The geology of the Piedmont belt is under the direction of Dr. E. B. Mathews, who has had associated with him in the study of the distribution of the basic eruptive rocks in the northern counties, especially Cecil, Harford and Baltimore, Dr. A. G. Leonard, who will spend the summer in tracing the distribution of these rocks across the State.

The geology of western Maryland, which is under the charge of Dr. Charles S. Prosser, is being investigated by him and Messrs. O'Harra, McLaughlin and Rowe, who have already nearly completed their work in this district. The magnetic survey of the State is being carried on under the direction of Dr. L. A. Bauer.

The new highway division of the Survey established by an act of the last Legislature is under the charge of Dr. H. F. Reid, who has associated with him Mr. A. N. Johnson as highway expert. These gentlemen, in conjunction with Professor Clark, have visited various sec-

tions of the State in the interest of investigation.

The State Geological Survey, in cooperation with the United States Department of Agriculture and State Experiment Station, has been making a special study of the distribution of soil types while the geological survey has been in progress. Mr. C. W. Dorsey has been in charge of this phase of the work. The connection between the soils and the indigenous plant life is readily apparent, and the Survey is paying some attention to the distribution of the flora of the State. Messrs. B. W. Barton and Basil Sollers are devoting a portion of the summer to this study.

GENERAL.

PROFESSOR J. R. EASTMAN, of the United States Naval Observatory, was retired from active service on July 29th. Professor Eastman has been continuously connected with the Observatory since 1862.

THE University of Edinburgh has conferred its honorary LL.D. on several of those who attended the recent meeting of the British Medical Association, including Professor H. P. Bowditch, of Harvard University, and Professor Wm. Osler, of Johns Hopkins University.

PROFESSOR VIRCHOW, of Berlin, will deliver the next Huxley lecture at the Charing-cross Hospital, on Wednesday, October 3d. The subject of the lecture, to be delivered by Professor Virchow in English, is 'Recent Advances in Science and their Bearing on Medicine and Surgery.'

SIR WILLIAM MCCORMAC has been elected President of the Royal College of Surgeons of England for the third year; Mr. T. Pickering Pick and Mr. Howard Marsh have been elected Vice-Presidents for the ensuing collegiate year.

THE British Order of the Bath has been conferred on Professor D'Arcy W. Thompson.

DR. P. KUCKUCK has been appointed custodian for botany at the Heligoland Biological Institute.

DR. WILLIAM PEPPER, of Philadelphia, died of heart disease in San Francisco on the night of July 28th. Dr. Pepper belonged to a prominent Philadelphia family and was born in that city in 1843. He was connected with the University of Pennsylvania in many capacities from the time he entered as a student, being provost from 1881 until 1894, and at the time of his death professor of the theory and practice of medicine. Dr. Pepper was the author of many works on medical and other subjects, the most important of which was his 'System of Medicine by American Authors.' He also founded the *Philadelphia Medical Times*. Dr. Pepper was prominent in many of the public institutions of Philadelphia, and to his initiative, ability and untiring energy the recent scientific, educational and medical progress of the city is in great measure due. From a medical school and an unimportant college, the University of Pennsylvania under his administration developed into a great university. He was largely or chiefly instrumental in founding the University Hospital, the Pennsylvania Museum and School of Industrial Art and other institutions. He was, at the time of his death, Vice-President and the real executive of the American Philosophical Society and President of the Philadelphia Museums.

THE French Society of Hygiene will award next year fifteen prizes for the best essays on the means of improving the condition of crews of fishing boats. The essays are to be sent in before January 1st to M. M. E. Cacheux, 25, Quai Saint Michel.

WE learn from the *British Medical Journal* that the Instituto Veneto di Lettere, Scienze ed Arti has awarded the three Balbi-Valier prizes, which are of the value of £120 each, respectively, to Senator Durante, professor of surgery in the University of Rome, for his treatise on General Special Surgical Pathology and Treatment; to Professor Bosehetti for his work on 'Tremulotherapy;' and to Professor Emilio Cavazzani, lecturer on physiology and pharmacology in the University of Ferrara, for his researches on the Thermogenesis, Glycogenesis and Circulation of the Fœtus.

THE fund collected by international subscriptions for memorials to Sir John Pender has now been closed. The marble bust of Sir John Pender by Mr. E. Onslow Ford, to be placed temporarily in the Board room of the Eastern Tele-

graph Company, and the replica for University College, London, required a comparatively small part of the fund. £5,000 were devoted to endowing the Pender Electric Laboratory of University College, £1,650 for endowing scholarships in Glasgow University, and £210 for the John Pender Gold Medal of the Glasgow and West of Scotland Technical College.

The Société Française d'Hygiène invites subscriptions for the erection of a memorial bust of the late Dr. Prosper de Pietra Santa, who was the founder and Permanent Secretary of the Society and editor of the *Journal de Hygiène.*

The report of the Council of the British Medical Association shows that the number of members is 17,746, an increase of 791 since last year. The number of new members, 1,473, is the largest recorded in any one year since the Association was founded. The revenue of the past year amounted to £40,433. The Association has purchased during the year, for £79,000, the freehold of the property on the Strand which they have held on lease. The sum of £366 has been allotted for scientific grants and £450 for scientific scholarships. A scholarship has been founded as a memorial of the late Mr. Ernest Hart, to be called 'The Ernest Hart Memorial Scholarship for Preventive Medicine.' The scholarship, which will be of the annual value of £200, will be tenable for two years. Mr. Hart, it will be remembered, was the editor of the *British Medical Journal*, the organ of the Association.

The annual meetings of the British Society of Chemical Industry were commenced at University College, Nottingham, on July 13th. The President, Professor Clowes, made an address, and the medal of the Society was awarded to Dr. W. H. Perkin, who in 1856 discovered aniline purple, a discovery which laid the foundation of the extensive coal-tar industry of the present time. The Society has now 3,196 members and its income last year was £4,738.

The Latin-American Scientific Congress will next meet in 1901 at Montevideo.

The *Revue Scientifique* has published a preliminary list of papers, some sixty in number, to be presented at the approaching meeting of the French Association for the Advancement of Science, which will be held at Nantes from the 4th to the 11th of August. Many of the papers are of interest, although the most prominent French men of science do not seem to attend the meetings of the Association.

Mr. Edward Dodson, of the Natural History Museum, London, has left England to join Mr. H. S. Cavendish, the African explorer, who is now at Beira.

Dr. E. Lewis Sturtevant, widely known as an expert on scientific agriculture, in which capacity he was connected with the United States government for many years, died at Framingham, Mass., on July 30th, aged fifty-six years.

Professor John Caird, the well-known writer on philosophical subjects, died on July 30th, aged seventy-eight years. His resignation from the principalship of the University of Glasgow was to have taken effect on August 1st.

Dr. Beattie Crozier's Civil List pension of £50 has been increased to £100 in order to enable him to complete his 'History of Intellectual Development on the Lines of Modern Evolution,' the first volume of which appeared in 1897.

Nature states that the French Société d'Encouragement has awarded the grand prize of 12,000 francs to M. Moissan for his numerous researches in chemistry; the prize of 2,000 francs for the experimental study of the properties of metals and alloys to M. C. E. Guillaume; the prize of 1,000 francs for an investigation of albuminoids to M. Fleurent; a prize of 2,000 francs to M. Cord for his work on the agriculture and geology of the soils in the department of Lozère; an *encouragement* of 500 francs to M. Capredon for his work on metallurgical chemistry; of 500 francs to M. A. Bigot for his work on enamels; of 1,000 francs to M. Pagès for his work on the agriculture of the Cantal Department; and 500 francs to M. Mazel for his work on the agriculture of the Vivarais district.

We learn from the London *Times* that news has been received at Cambridge of the arrival of the Cambridge Anthropological Expedition to Torres Straits at Murray Island. The expedition reached Thursday Island on April 23d.

The Hon. John Douglas, C.M.G., the Government Resident, did all in his power, personally and officially, to advance the aims of the expedition, as did also the other government officials and many others. The Hon. J. G. Byrnes, Chief Secretary, sent a cordial telegram of welcome and promise of assistance from Brisbane, on behalf of the government. After a week's delay a start was made for Murray Island in two open luggers, and owing to the unfavorable weather it took another week to traverse the 120 miles between the two islands. All the party suffered considerably from heat and exposure in the open boats. The Murray Islanders gave Dr. Haddon a very hearty welcome, bringing gifts of cocoanuts and bananas as expressions of good will. They appeared to understand the main objects of the expedition. A deserted mission house, in which Dr. Haddon stayed ten years ago, was occupied as a dwelling house, and had also been converted into a temporary anthropological and psychological laboratory, photographic studio, surgery and dispensary. All the members of the expedition were in good health, and work has begun in earnest.

SIR MARTIN CONWAY has left England for Bolivia, where he intends to explore the high group of the Andes containing the peaks Illimani and Illampu. He is accompanied by the Alpine guides Antoine Mauqignaz and Louis Pellissier, who made the first ascent of Mount St. Elias, in Alaska, last year with the Duke of the Abruzzi.

AT a meeting of the Zoological Society of London, on June 11th, the Secretary read a report on the additions that had been made to the Society's menagerie during the month of May, 1898, and called special attention to a young female Mountain Zebra (*Equus zebra*) and a young male Leucoryx Antelope, acquired by purchase; a young male Reindeer (*Rangifer tarandus*), presented by the Hon. M. A. Bourke; and two Black-necked Swans (*Cygnus nigricollis*), hatched in the Gardens.

IT is expected that the new laboratory building of the Johns Hopkins University Medical School, adjacent to the hospital, will be ready for occupation in the autumn. It will accommodate the laboratories of physiology, of physiological chemistry and of pharmacology.

AN Institute of Hygiene has been opened in Buenos Ayres. The Director of the Institute is Dr. Ferruccio Mercanti.

THE buildings of the United States Fish Commission at Woods Holl were examined with a view to using them for an army hospital. Fortunately, the buildings were found unsatisfactory for this purpose, as otherwise the important work now in progress under the Fish Commission, as well as that of the Marine Biological Laboratory, would have been completely stopped for the year.

IT will be remembered that the sum of $650,000 has been appropriated by the United States government for the representation of the country at the Paris Exposition. Mr. Ferdinand Peck, the newly appointed Commissioner, has had a conference with the President, and it is said that the latter will recommend an appropriation of $400,000 additional.

A LARGE part of the session of the British House of Commons on July 19th was devoted to the consideration of the vaccination bill founded by the government upon the recommendation of the Royal Commission. Much opposition was shown to the bill, and Mr. Balfour, on behalf of the government, appeared to favor its modification in the sense that vaccination would not be required if a parent stated that he believed it to be prejudicial to the health of his child.

THE great activity among students of our Southeastern flora has become a subject of common remark. The results of this work have been appearing in numerous articles in the botanical journals from Messrs. Small, Nash, Bicknell, Beadle, Kearney, Underwood, Earle, Pollard, Ashe and others. Much of this published work has been the result of personal investigations in the field, which speaks well for the great botanical interest attached to this flora. Several separate works on the subject have been prepared or are in course of preparation. The 'List of Alabama Fungi' by Messrs. Earle and Underwood was published by the Alabama Polytechnic Institute. Dr. Mohr's monumental work on Alabama plants will soon appear as a

government publication. We understand Dr. Small has in progress a Botany of the Southeastern United States. A new edition of Chapman's Manual has lately appeared. Outside of Curtis's well known series of Florida plants but few distributions of the plants of this region have been made, though there has been great demand for them among botanists throughout the world. One of the important functions of the lately organized Alabama Biological Survey is the collection and distribution of the plants of all orders occurring in Alabama. This work prosecuted under the auspices of the Alabama Polytechnic Institute, at Auburn, and carried on for a year and a-half without supporting funds from official sources, has already resulted in the formation of a reference herbarium of about 10,000 sheets, and an exchange herbarium of about an equal number. This exchange material contains fine series of many interesting species, varieties and forms, and is at the service of the botanical world for sale or exchange.

As has already been announced, the autumn meeting of the Iron and Steel Institute will be held in Stockholm on Friday and Saturday, August 26th and 27th. We learn from *Nature* that an interesting and varied program has been prepared by the local committee, and seven papers have been promised, two being by Swedish metallurgists. Mr. Richard Ackerman, Director-General of the Swedish Board of Trade, an honorary member of the Institute and a Bessemer gold medallist, will read a paper on the development of the Swedish iron industry, whilst Professor G. Nordenström, of the School of Mines, Stockholm, will submit a communication on the most prominent and characteristic features of Swedish iron-ore mining. Mr. C. P. Sandberg will discuss the danger of using rails of too hard a nature, whilst Professor W. C. Roberts-Austen, C.B., F.R.S., will describe the action of explosives on the tubes of steel guns. The chemical side of metallurgy will be represented by three papers. The first will be by Mr. J. E. Stead, on brittleness in steel produced by annealing; the second by Professor J. O. Arnold, of University College, Sheffield, on the micro-chemistry of cementation; whilst the subject of the third paper will be the influence of metalloids on cast iron, by Mr. Guy R. Johnson, of Tennessee, U. S. A. An excursion of twenty days' duration will follow the meeting.

The following appeal, which should be regarded in America as well as in Great Britain, has been sent out by the committee of the Society for the Protection of Birds, London. "The committee of the Society for the Protection of Birds are convinced that the objects of the Society would be greatly helped if the assistance of landowners, shooting tenants and farmers could be obtained, as, unless united action be soon taken, many of the country's birds, especially the rare birds of prey, will shortly become extinct. This, most people agree, will be a matter of universal regret, as well as a great loss to the avifauna of the United Kingdom. It is only through the cooperation of gentlemen possessing shooting and other rights over land that it is possible to effect any real improvement in this direction; and their assistance would, in the opinion of this Society, be best given by their not allowing keepers and other persons on the land a free hand as to what birds may be killed, which is often the case at present, but, on the contrary, by giving strict instructions as to what birds only may be destroyed, which should properly be only those birds that, from their abundance in any particular district, may do real harm. The committee also desire to draw your attention to the use of the pole trap, which ought in no case to be allowed, because, even if a landowner wished to preserve rare birds of prey, this trap could show no such discrimination. It is, besides, a most cruel instrument, because, if it is not examined regularly, any bird caught in it may hang for days in misery, and on this account this trap has been prohibited on many estates. The Society would be greatly obliged if you would kindly give these matters your careful consideration, and, if possible, give instructions in the manner indicated, or in any other way that may seem good to you. In order that there should be no misapprehension as to the objects of the Society the following extract from the rules is added: 'The attitude of the Society is strictly neutral on the question of the killing of game birds and legitimate sport of that character.'"

UNIVERSITY AND EDUCATIONAL NEWS.

MRS. EMILY PRISCILLA EDGELL HUNT has bequeathed £5,000 to King's College School, London, for scholarships to be awarded for proficiency in practical sciences. She also bequeathed £1,000 to the benevolent fund of the Institution of Civil Engineers, and large sums to London hospitals.

SIR WILLIAM FRASER has bequeathed £35,000 and half the residue of his estate to the University of Edinburgh.

THE Edinburgh University Court has appointed to the new professorship of public health and sanitary science at Edinburgh University Dr. Charles Hunter Stewart, who for the past ten years has acted as chief assistant in the bacteriological laboratory connected with the chair of medical jurisprudence and public health in Edinburgh University.

DISCUSSION AND CORRESPONDENCE.

SCIENCE IN THE BUREAU OF EDUCATION.

DOUBTLESS a large number of the readers of SCIENCE have just received the first volume of the Report of the Commissioner of Education for 1896–97, and after remarking on its unusually prompt appearance have put it away unopened, to await some emergency in which its statistics may be useful. It may be desirable to call attention to the fact that this report is distinguished above its fellows by a most remarkable article on 'Recent Contributions of Biology, Sociology and Metallurgy to the Curriculum of Agricultural Colleges.' This forms Chapter 20 of the Report, pp. 923–1080. It is of the biological section that I wish to speak.

Considering that the article deals with 'recent contributions,' it is rather surprising to find the amount of space given to quotations from De Saussure and Liebig. But it is still more surprising to find that the author quotes with approval on p. 945 the statement of the former writer that "plants do not take all their mineral food out of solutions such as those which are artificially made, * * * but they take them for the most part from compounds which we are unable to form, namely, out of such compounds in which these salts are chemically combined with oxygen, hydrogen. nitrogen and carbon in humus extract, a fact that can only be revealed to us by an examination of the ashes of the plant." It would seem that the writer had never heard of water-cultures.

After giving quantitative proof (from de Saussure and Boussingault) of the absorption of CO_2 and the giving-off of O by green leaves, the remark follows, p. 929: "It is quite safe, then, to say that the leaf eats (so to speak) of carbon, and that indirectly it takes this from the air, though it must never be forgotten that the capital function of the leaf is, to use an expression necessitated by our ignorance, 'to elaborate' the sap. Why the leaf should act thus through a green substance it contains called chlorophyll has engaged the attention of many, but there is something about the question that stunts the growth of an hypothesis." (!!)

"The root is an apparatus to absorb water. It is composed of three parts; a cap or penetrating point, a muff of fine hairs which follows close behind the cap, and finally an arm or the body proper of the root, which is at once an anchor, an alimentary canal and a pump." (p. 931.)

Apparently the Jews of the Education Bureau have no dealings with the Samaritans of the Department of Agriculture, or the writer would hardly have said that agrostology is the Gallic name for soil physics. And he might have found a zoologist to tell him that 'the substance resembling cellulose called tunicine' is not so called 'from its being found only in the mantle which covers the body of oysters and other mollusks.' He might also have been shown a specimen of growing yeast, and one of *Protococcus*, which would have kept him from evolving the 'diagrammatic sketches' of these plants on p. 971.

It is impossible to do justice to this writer without longer citations than SCIENCE probably can afford space for. I will simply mention some of the most striking passages. There is some fine confused reading in the account of the nitrogen question, on pp. 929–940, though Schloesing and Müntz, Hellriegel and Wilfarth, are quoted in some detail. The gem of the chapter is, however, the section on the life-process and instinct of the plant, and particularly the subsection on the 'development of the male cell (*i. e.*, pollen-grain) in the ovary,' from which it appears that "antecedent to the fecun-

dation there is a microbous growth which sets up interior disarrangements, * * * which eventually result after fecundation in the formation of a miniature plant. The strange thing about the matter is that the little plant may, when grown up, turn out to be greatly different from either the plant from which the pollen drifted or from the plant which caught and nourished the pollen on its stigma and then received the 'being' of the pollen in its ovary." The question of the ascent of water in plants is attacked, and the author seems sceptical about the existence of root-pressure and transpiration, while the famous spiral tendency is revived in connection with the ascent of sap and phyllotaxy. Evolution, natural selection and spontaneous generation are mentioned in a way that shows that there are still dark places into which correct notions of these phrases have not penetrated. As has been indicated, quotations from good authors are interspersed, but the result is rather like that which follows a mixture of ice cream and lobster salad.

It is hard to say what object this article can be conceived to serve. The distinguished metaphysician who has been the efficient head of the bureau so long, and may he long remain there, might perhaps be able to give an answer from the depths of his philosophic lore. No plain man can. Fortunately from the method of its publication, the indigestible mass of actinic rays, earthworms, Rothamsted experiments and circumnutation—in addition to the constituents already mentioned—cannot do much harm except to the naïve folks who think that government reports are a sort of gospel.

Seriously, although scientific men are becoming accustomed to the notion that pedagogical 'experts' have a plenary inspiration which gives them the right to discuss all subjects under the sun without studying them; and although they may simply smile when a psychologist speaks of the legs of a hydra, and opposes the sarcolemma to the germ-plasm, or attributes the upward growth of a stem to heliotropism, if he has something to say that compensates for the blunders; yet it does seem that these people might at least take the trouble to submit their manuscript to some *Fachmann* before publication. And the Bureau of Education might do well to investigate the training of its 'specialists' a little before employing them to write up scientific subjects.

University of Colorado. John Gardiner.

The Psychology of Suggestion.

To the Editor of Science: Permit me to make a few remarks in regard to the review of my book, 'The Psychology of Suggestion' by Professor Wm. Romaine Newbold in Science for June 24, 1898.

Professor Newbold contends against the truth of my second law, that of abnormal suggestibility. He brings the phenomena of *rapport*. "In states of heightened suggestibility," he writes, "suggestibility to suggestion has no significant relation to the mode in which the suggestion is administered, but rather to the *source whence it comes.*" (The italics are his own.) "Rapport," he says further on, "although not an inevitable, is perhaps one of the most constant traits of heightened suggestibility, and this Dr. Sidis' second law ignores." Now this is not true. *Rapport* is not a characteristic spontaneous trait of the advanced stages of hypnosis, it is itself due to a suggestion forced on the subconsciousness of the subject. Where the personal element is considered important, there the phenomena of *rapport* will naturally be frequent. Where, however, it is realized that hypnosis has little to do with the personality of the experimenter, *rapport* is *absolutely* absent even in the very last stages of hypnosis. Thus in none of my best subjects have I found the phenomena of *rapport*. *Rapport* had to be specially induced by most emphatic suggestions. This is simply due to the fact that in my experiments I have taken precaution to guard against all unconscious suggestions in general, and particularly against the 'personality suggestion.' The importance of the personal element, 'the source' in hypnosis is a widely spread, but an unjustified belief due, no doubt, to some lingering remnants of mesmeric theories. As a matter of fact, *rapport* is not spontaneous in hypnosis, it is induced by suggestion, and, like all other suggestions, depends on the conditions and laws of suggestibility.

Professor Newbold finds fault with my preliminary definition of suggestibility. I won-

der Professor Newbold does not see that the definition given in the first chapter is only provisional to start the work with, that the nature of suggestion and suggestibility is worked out in the course of the first part, and that the final definition is not arrived at before the end of the eleventh chapter.

A few words more before I conclude. Professor Newbold finds my physiological theory rather incorrect when confronted with Apathy's investigations. I do not find that my theory is to any extent shaken by Apathy's 'anastomosis.' Apathy's work may hold good for the nervous system of the lower invertebrates, but not of the cerebro-spinal nervous system and especially of the association areas. Apathy himself admits it. I am happy to say that the eminent pathologist, Professor Ira Van Giesen, accepts the same physiological theory, and in a special work will take up this point about Apathy. and will furnish experimental data demonstrating the truth of the position taken by me in the book 'The Psychology of Suggestion.'

Professor Newbold's criticism is fair and candid, and one cannot help contrasting it with the virulent, almost personal, onslaught of those academic psychophysicists, especially of the Wundtian fold, who lack and neglect all knowledge of mental pathology and who attack bitterly any one who has the courage to proclaim openly the poor and sterile state, the trivial nature of the scholastic laboratory science of normal 'student psychology.' BORIS SIDIS.

PATHOLOGICAL INSTITUTE OF THE
NEW YORK STATE HOSPITALS, NEW YORK.

CELLULOID FILMS.

TO THE EDITOR OF SCIENCE: My own experiments and sad experiences in the use of celluloid 'cut films' instead of glass plates for photographic purposes on long expeditions prompt me to write a warning to those who will read the note quoted in SCIENCE, July 22, 1898, page 106. If the advice given by Mr. Stillman were followed by scientists without further test I greatly fear that their return from a six months' expedition with numerous undeveloped 'films' safely stowed away for development at leisure would be made less enjoyable after a few hours in the dark room. Two years ago I made trial of some fresh films and thought them so superior to glass because of their lightness that I adopted them for use on a visit by bicycle to the astronomical observatories of Europe. I could not find ten dozen in stock in New York without taking some that were three months old. I was in Europe only three months, and during that time carried those films and a camera with other baggage on my bicycle for two thousand miles, on hot days buoyed through the 'slough of despond' by the expectation of having at least one hundred fine photographs of observatories and scenery. The camera was a familiar one, and I had had long experience in photography in America and in South and Central Africa with glass plates which had always proved successful. But, alas! when I returned to the States and at once proceeded to develop the films I could find only the faintest traces of the scenes which ought to have been there. There was every indication that the acids in the celluloid had destroyed the sensitiveness of the emulsion either before or after exposure. Since then experiments on 'films' of various ages and the questioning of professional photographers who have developed many thousands of these 'films' have confirmed my belief that *as a rule* they may be regarded as practically worthless after they had been made a year, and are very unreliable after six months. I mean by 'unreliable' that it is impossible to predict by the action of one plate what the time of exposure on another plate of the same emulsion ought to be.

Hence I conclude that one should be very cautious in adopting the suggestions of Mr. W. J. Stillman, from whom you quote, if the expedition is to last more than six months from the time when the plates were made; and in every case I should prefer to get fresh films every month and develop them as they are exposed.

HERMAN S. DAVIS.

COLUMBIA UNIVERSITY, July 22, 1898.

SCIENTIFIC LITERATURE.

Au Pays des ba-Rotsi. By ALFRED BERTRAND. Paris, France, Hachette et Cie. 4to. Pp. 333 and 10. 104 illustrations.

This volume, prepared in the handsome style of the famous French publishing house from

which it has emanated, has a great many things in its favor. The illustrations are particularly good.

It deals with a country whose northern boundary, as yet unknown, probably reaches the watershed lying between the Congo and the Zambesi. On the east it is limited by the Kafukwe river and on the west by an indefinite boundary at about 20° east of Greenwich. On the south it is bounded by the Zambesi and the Linyanti. The extent of the country, therefore, might be defined by stating that it lies between the 12°th and the 18°th south latitude, and between the 20°th and 29°th in east longitude. The essence of the book, however, is not in the three hundred pages of the text; but in the twenty pages of the two appendices.

The first part of the volume deals with a visit to the diamond mines at Kimberley. It is interesting to note that, while there were no houses upon the site of this city in 1870, Kimberley now contains nearly twenty thousand inhabitants and its daily product reaches the sum of $50,000. The railroad from the Cape extends through this city to Mafeking. It is only at this latter point that the signs of civilization begin to disappear. Here it is that the caravans start for the interior.

Some of the comments of our writer upon the phases of life through which he passes are interesting, because they indicate the watchful French mind, wide open to new impressions. He seems to admire immensely the 'Bouledogues' taken along as guardians of the camp. Then come a series of observations upon the experiences of the caravan in its trip to the northward, along the border of the desert of Kalahari. At Palapye he meets King Kahma, the disciple of Moffat and Livingston, who apparently is a model monarch. It appears that there is at least one place where the sale of alcoholic beverages can be prevented by regal enactments, and this African king seems to be more successful than some of his white brethren in the prosecution of this work.

The author comments upon the supervision of these colonies by Great Britain with great satisfaction, as he finds that they are managed with much good sense and are practical because they are adapted to the conditions.

It is hardly necessary to devote any space to the consideration of the details of the trip to the Zambesi, with which nearly one-third of the volume is taken up. At length, however, the Machile river is reached. This stream is a branch of the Zambesi, and, though known before, has only been tentatively placed upon the maps. The author can be interesting, but a great deal of the story suggests nothing but lists of mud settlements, terribly hot days, bad water and various subsidiary rhapsodies upon each new dish of game which seem to produce a novel sensation upon his digestion. He seems to have paid a profitable visit to King Lewanika, who gave him a great deal of information with reference to the country he was exploring; but much of the information given is still a secret between himself and the king, as the description given of this new region is very scanty, indeed.

The author visits the celebrated Victoria Falls of the Zambesi before starting out upon his return trip, and his description of the trip down the river in canoes is well done, in spite of the fact that we become tired at length of the groans of the hippopotami and the yawns of the crocodiles.

His account of the beauty and grandeur of the famous falls is well worth reading, though it would seem that geology and geography rather suffer in his hands from neglect. On his return journey the author has a bad attack of fever in the 'thirst' desert, where he is nearly prostrated and has some very sad experiences. Eventually, however, he reaches Pretoria. From this city he visits the gold mines of Johannesburg, of which a careful description is given. He happened to be in the city at the time of the Jameson raid in January, 1896, and his experiences as a prisoner in the city at that time are well given. The trip occupied nearly a whole year, from March 23, 1895, to March 2, 1896.

The author was fortunate in obtaining from M. Jalla the records of ten years of temperature observation, from which the following notes are taken:

Hot season.

+ 47° C. in shade 2 to 4 p. m.

+ 20° to 22° C. at night.

End of October.

Cold season.
+ 24° to 25° C. during day.
+ 6° to 10° C. during night.
May, June, July.

In the hot season the thermometer in the sun reaches 60° C., and the author comments upon the necessity of taking the thermometer under shelter to prevent its bursting.

The country generally is considered very unhealthy, as even the natives suffer with the fever.

In the first appendix notes are given upon the fragmentary history of the people of this region, which is about equal in area to that of France. The habits and customs of the people are briefly discussed. The earlier type of punishments for disobedience or neglect are of the most cruel character for even the slightest offenses, as, for example, when one of King Lewanika's rowers became tired he was deliberately thrown overboard to keep company with the crocodiles.

The religious ideas of this section of the country are more advanced than in any other portion of Africa. They have a modified form of ancestral worship, without idols or fetiches. They have both male and female supreme beings, the former symbolized by the sun and known as Nyambe, while the latter is represented by the moon. She was the mother of the animals, and finally of man. Eventually Nyambe and the men of the world came into disagreement, and while he showed his power by resuscitating the animals which men killed, man, however, became so very intelligent that Nyambe was forced to escape to the heavens by means of a spider's web and has been invisible since that time.

They believe in metempsychosis and during their life choose the animal form in which they prefer to return to the earth. They initiate themselves by eating worms from the decayed bodies of their chosen animal. They will then, upon any festal occasion, act the part of these animals by imitating their motions and their cries.

They are very superstitious, believing in charms of all sorts, and they attribute the better shooting-powers of the white man to be due to the possession of an amulet of which they are ignorant.

These natives are an industrious people and work metals very well, and although their methods are of the most primitive sort they produce good spears, axes and knives. Under proper guidance they could easily develop along mechanical lines, and missionaries who have lived with them many years wish very much to start an industrial school with this in view.

The resources of the country are little known. Iron is known to exist, but the main value of the region, so far as seen, is in its woods, many of which would be valuable even for transportation. Animals are still found in great numbers and variety, although the most valuable of them all, the elephant, is said to be disappearing rapidly. The insects are likewise numerous and are said to be a terrible pest.

The words of the missionary Coillard concerning this part of the world, where the waves of immigration are dashing their foam well in towards the center of the continent, are significant:

"Listen to the native songs in a minor key; they are in reality but groans. Hear them tell you that their heart is black, *i. e.*, that it is full of sadness, yes, black as their skin, and you will realize that from the cradle to the grave they carry through life the symbol and the livery of sorrow. If these races are to have a future, as seems certain, what will it be? It seems that it will undoubtedly be dependent upon the character which the mental, moral and physical powers of the white race will choose to give it."

The second appendix gives a summary of the report made by Captain A. Saint-Hill Gibbons, Percy C. Reid and the author to the Royal Geographical Society on January 4, 1897 (see *Geographical Journal*, Vol. IX., No. 2).

WILLIAM LIBBEY.

The Art of Taxidermy. By JOHN ROWLEY, Chief of the Department of Taxidermy in the American Museum of Natural History, New York City. New York, D. Appleton & Co. 1898. Pp. xii + 244. 20 plates and 59 text figures.

This book is a good exemplification of the adage that there is always room at the top, for while scores of books have been written on the art of taxidermy, and the best of them within the last decade, this is none the less indispen-

sable to any one who wishes to keep up to date. The eight chapters into which the work is divided are devoted to collecting; tools and materials; casting; birds; mammals; fish, reptiles and crustaceans; skeletons; and the reproduction of foliage for groups. There is in addition an appendix giving the addresses of reliable firms from whom tools and materials may be purchased. All these contain important information and all are based on personal experience, and while naturally in some cases much of the ground has already been covered, yet it is surprising to see how much there is not only new, but good. The most important chapter is that relating to the mounting of mammals, and particularly of large mammals, ability to do this well being the crucial test of a taxidermist. Time was when they were stuffed in the most literal sense of the word, but the last twenty years have wrought a great change, and it no longer suffices to simply fill a big mammal with straw; he must be fitted to a nicety over a manikin modeled into shape with the greatest care. Mr. Rowley's special device is the *papier maché* manikin made on wire cloth, and this he claims when the skin is properly glued on will stand the test of time, a claim that is borne out by the appearance of specimens mounted in this manner, although we can be more certain of the result ten years from now. Only those who have had a practical acquaintance with the mounting of large mammals and watched their behavior in steam-heated halls can appreciate the desirability of some process that will give freedom of manipulation and prove enduring, for, like Mr. Rowley, we have seen the wreck and ruin of some beautiful specimens that simply went to pieces through the splitting of the skin, brought about by atmospheric changes. It might, however, have been well to have briefly described the manikin of excelsior, giving it as an alternative, since in the majority of cases it will do very well, and one without experience might hesitate before attempting the somewhat more difficult *papier maché* method.

Another valuable chapter is that devoted to the reproduction of foliage and flowers, for while this subject is well treated by Montagu Brown, yet he unfortunately omits a most important piece of information which Mr. Rowley supplies, namely, how to make the 'fabric' which is the basis of it all. While this reproduction may not be taxidermy, it has yet become an important matter since the modern museum calls, or should call, for the exhibition of groups showing animals amid their natural surroundings, and unless these surroundings are duplicated with great skill the result is discouraging.

The chapter on skeletons, though brief, is very good, although we suspect it would not occur to any one not familiar with the manner in which things are done at the American Museum to suggest the use of porcelain bath tubs for macerating purposes.

In regard to fishes Mr. Rowley well says that in most cases they are better reproduced by casting than by skinning and mounting the skin, and this is emphatically true of the larger species which seem to delight in setting at naught all efforts to mount them.

Here and there one could wish for just a little more information than is given, but as one of the aims of the book was to supply a good manual at a moderate price, conciseness was necessary and the book can be recommended not only to those who wish to be, but to those who already are taxidermists.

F. A. L.

Water and Public Health. By James H. Fuertes. New York, John Wiley & Sons. Pp. 75. Price, $1.50.

The method adopted by Mr. Fuertes, of stating many of his statistics in graphic form, is very acceptable to the general reader. The eye will grasp the meaning of a chart, and the mental picture of the same will be retained, while groups of simple figures make but a small impression.

An excellent point, insisted on by the author and forcibly illustrated, is that Europe is far ahead of us in the matter of carefully purifying such public waters as are suspected of being contaminated, and he further shows that America cannot expect immunity from epidemic disease should she continue the use of polluted supplies. The book is a valuable contribution to the literature of Water Supply.

W. P. Mason.

The Arrangement of Atoms in Space. By J. H. VAN'T HOFF. Second, Revised and Enlarged Edition. With a Preface by JOHANNES WISLECENUS, and an Appendix, Stereochemistry among Inorganic Substances, by ALFRED WERNER. Translated and Edited by ARNOLD EILOART. London, New York and Bombay, Longmans, Green & Co. Pp. xi + 211.

In the earlier development of theories with regard to the structure of chemical compounds, chemists were very careful to state that the formulæ used were not intended to represent, at all, the actual geometrical positions of the atoms within the molecules. It was with a great deal of scepticism, therefore, that the chemical world received the first attempts at a logical discussion of the arrangement of atoms in space. These attempts were made by van't Hoff and by Le Bel, independently, in 1874. For many years the theory made little headway and, at most, received some notice in connection with the discussion of optically active substances. Gradually, however, the theory proved so useful that the present situation is well summarized in the following words of Professor Wislecenus from his preface to this book:

"The old opposition to the principle has almost died out; where it still lives it is directed against the ultimate basis—against the Atomic Hypothesis itself—and does not deny that the doctrine of atomic arrangement in three dimensions is a logical and necessary stage, perhaps the final stage, in the chemical theory of atoms. * * * It has already effected to the full all that can be effected by any theory; for it has brought into organic connection with the fundamental theories of chemistry facts which were before incomprehensible and apparently isolated, and also enabled us to explain them from these theories in the simplest way. By propounding to us new problems, the new theory has stimulated empirical investigations on all sides; it has caused a vast accumulation of facts, has led to the discovery of new methods of observation, has become amenable to the tests of experiment, and has at the same time started in our science a movement full of significance—in a certain sense, indeed, a new epoch."

The present work is a new and thoroughly revised edition of van't Hoff's well-known book. It is especially satisfactory in its discussion of stereoisomerism in its relation to optical activity. The consideration of ethylene derivatives and of ring compounds is also sufficiently full, while the concise treatment of the stereochemistry of nitrogen compounds accords well with the present rather unsatisfactory conditions of the topic. The brief statement by Alfred Werner of his views upon the stereoisomerism of certain inorganic compounds is an important and valuable addition.

The present book is noteworthy for the manner in which the fundamental conception is reduced to the simplest possible expression. All hypotheses which are not absolutely essential are omitted. In this respect the book is in marked contrast with that of Auwers on the same subject.

In a few cases, and especially for camphor and atropine and their derivatives, structural formulæ are given which are, to say the least, very improbable, if not entirely impossible, according to our present knowledge. While questions of optical activity are undoubtedly of great importance in the discussion of possible formulæ for these compounds, it seems unfortunate that such doubtful formulæ should have been used in the consideration of the fundamental principles of asymmetry as connected with optical activity.

The work of translation has been well done, and the translator, who is an authority on the subject, has added several important notes of his own.

W. A. NOYES.

Laboratory Experiments on the Class Reactions and Identification of Organic Substances. By ARTHUR A. NOYES and SAMUEL P. MULLIKEN. Second, Thoroughly Revised Edition. Easton, Pa., Chemical Publishing Co. Pp. 28. Price, 50 cents.

This little book may be considered as the elements of qualitative analysis for organic compounds. Because of the enormous number of these compounds the subject is not susceptible of any such set mechanical treatment as is usually given to inorganic qualitative analysis. For this reason it is all the more useful for the purpose of developing thoughtfulness and

originality on the part of the student. The work is intended to supplement the instruction in organic preparations, which has been found by the authors to "fail, to a surprising extent in the case of most students, to give a knowledge of the important characteristics of the various classes of organic compounds, and, therefore, of the fundamental principles of the science." The selection of reactions and the method of treatment are excellent, and the book will prove a very useful one. The number of reactions might, of course, be easily extended; especially is it desirable to include Liebermann's reaction for secondary amines and the general reactions for vegetable alkaloids. It would also be an advantage if the names by which some of the reactions are constantly known to chemists were given, and an occasional reference to the literature would be very useful.

W. A. Noyes.

SCIENTIFIC JOURNALS.

American Chemical Journal, July: 'A Reduction of Permanganic Acid by Manganese Peroxide:' By H. N. Morse and C. L. Reese. The relative action of manganese peroxide and hydrogen in causing the reduction of potassium permanganate has been studied and the results compared with those obtained by Meyer and Von Recklinghausen. 'The Atomic Weight of Cadmium:' By H. N. Morse and H. R. Arbuckle. The atomic weight has been redetermined and a correction introduced for the gas retained by the oxide. The mean corrected value is 112.377. 'A Table of Atomic Weights:' By T. W. Richards. This table has been compiled from a comparison of the best results obtained in atomic weight work, the probable chemical accuracy of the processes being the criterion. 'Researches on the Cyclo Amides: α-Ketobenzmorpholine and α-Benzparaoxazine Derivatives:' By H. L. Wheeler and B. Barnes. 'The Action of Amines on Acylimidoesters: Acyl Amidines:' By H. L. Wheeler and P. T. Walden. 'On a New Form of Water Blast:' By B. B. Boltwood. The author has devised a form which gives a high efficiency with a small amount of water. 'On the Periodic System and the Properties of Inorganic Compounds:' By J. Locke. The author discusses the Periodic System and shows that the usual arrangement, which is very satisfactory when we only consider the behavior of the elements themselves, is very unsatisfactory when we compare the properties of the compounds of these elements. 'The Action of Sulphur upon Metallic Sodium:' By J. Locke and A. Austell. This investigation shows that the monosulphide cannot be formed by direct combination at temperatures below 220°. 'On Some Compounds of Trivalent Vanadium:' By J. Locke and G. H. Edwards. 'The Conductivity of Aqueous Solutions of Praseodymium and of Neodymium Sulphates:' By H. C. Jones and H. M. Reese. This number also contains a note on the preparation of Liquid Hydrogen, which was obtained by Professor Dewar, who also liquefied helium by introducing a tube of the gas into the liquid hydrogen.

J. Elliott Gilpin.

The *American Naturalist* for June opens with an article on the fresh-water biological stations of America, by Dr. Charles A. Kofoid. The relative advantages of marine and fresh-water stations are commented on, and a description is given of the Lake Laboratory of the Ohio State University, prepared by the late Professor D. S. Kellicott, of the Biological Station of the Indiana University by Professor Carl Eigenmann, and of the Illinois Biological Station. Professor H. C. Bumpus contributes an article on the identification of fishes artificially hatched, in which he makes an interesting application of the statistical method of representing variations. The series of papers on the wings of insects by Professor Comstock and Dr. Needham is continued, and Dr. V. Sterki writes on the classification of *Ciliate Infusoria*.

NEW BOOKS.

Plant Life considered with Special Reference to Form and Function. Charles R. Barnes. New York, Henry Holt & Co. 1898. Pp. x + 428.

A Brief Course in Qualitative Analysis. Ernest A. Congdon. New York, Henry Holt & Co. 1898. Pp. iv + 62.